SAFETY PRECAUTIONS

GENERAL GUIDELINES

1. Always use the manufacturer's replacement safety components. The critical safety components marked with ▽ on the schematics diagrams should not be by other substitutes. Other substitute may create the electrical shock , fire or other hazards. Take attention to replace the spacers with the originals. Furthermore where a short circuit has occurred , replace those components that indicate evidence of overheating.

2. After servicing , see that all the protective devices such as insulation barriers, insulation papers, shields and isolation R-C combinations are correctly installed.

3. When the receiver is not being used for a long time of period of time , unplug the power cord of the Adaptor from the AC outlet.

Color TFT LCD Module is very sensitive both electrically and physically.Users, therefore, are requested to follow the "Guidance of handling color TFT LCD Module"on the followings.

1 - Be careful not to make scratch on the polarizer.

Surface of polarizer is soft and can be physically damaged easily.
Please do not touch, push or rub polarizer surface with materials over HB hardness.

2 - Keep clean the surface.

Please wear rubber glove when touch the surface of LCD screen. Please use soft and anti-static material as cleaner.

3 - Keep out of water.

Water on/in the LCD may cause electrical short or corrosion. Please wipe out dry or water carefully.

4 - Prevent swift Temperature & Humidity change.

Instantaneous temperature and/or humidity change can make dew or ice which cause nonconformance such as malfunction.

5 High temperature & high humidity reduce the life-time.

LCD is not proper to be used at high temperature and high humidity. Please keep specified temperature and humidity condition.

6 - Keep out of Corrosive Gas.

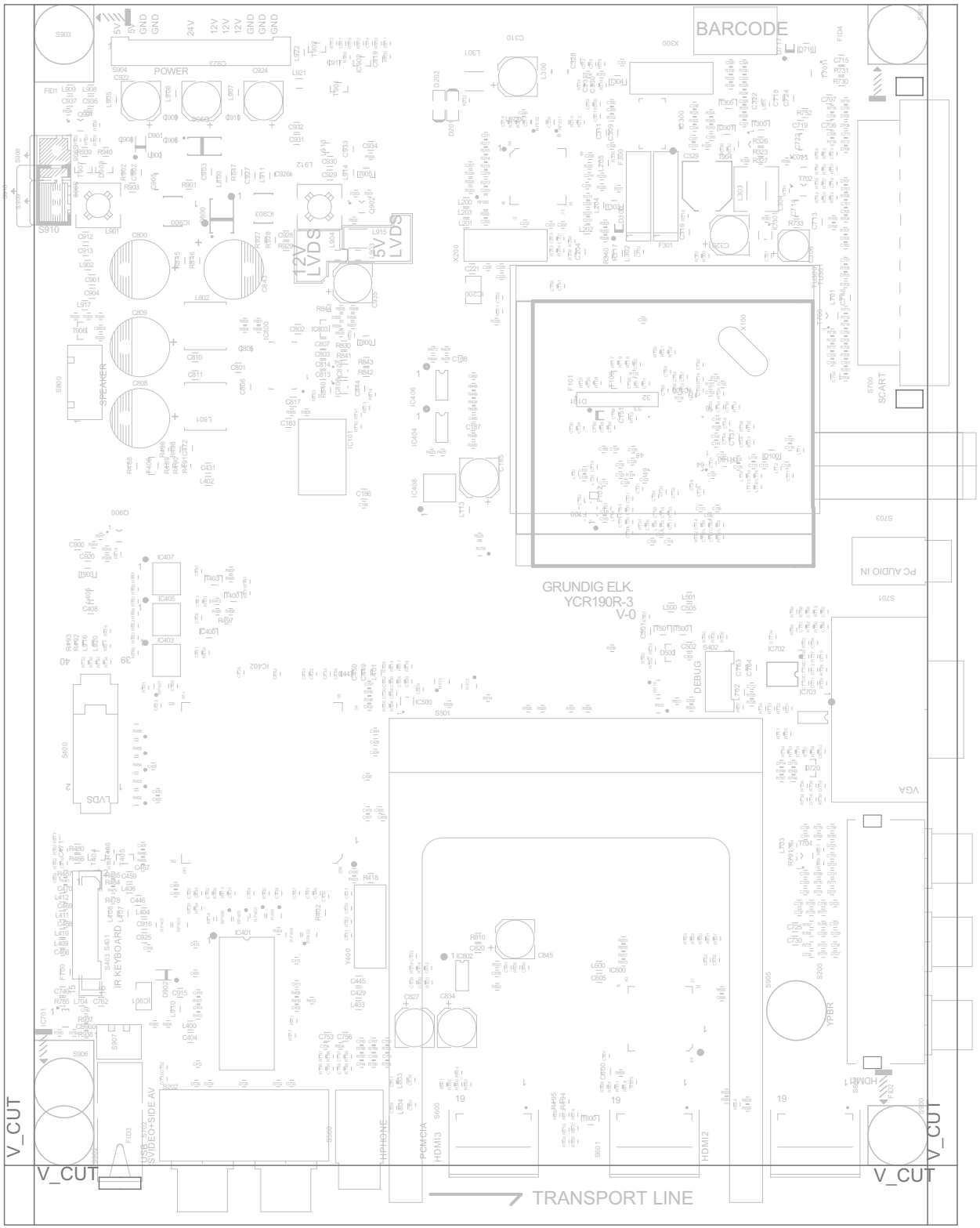
Corrosive gas effect the polarizer and the circuit chemically and cause defects accordingly.

7 - Electrostatic discharge can make Damage

There are electro-static sensitive components such as CMOS in LCD Module. Please earth human body when handle the LCD.In addition, please do not touch the interface connector pin with bare.

8 - Do not operate for a long time under the same pattern

Operating LCD for a long time under the same pattern can cause image persistence and can damage it. Please follow following guidance.
1. Turn the power off when do not use.
2. Change the pattern periodically.


BARCODE
POWER
SPEAKER
LVDS
5V LVDS
12V LVDS
SCART
PC AUDIO IN
VGA
DEBUG
IR KEYBOARD
USB SVIDEO+SIDE AV
HPHONE
YPBR
HDMI1
HDMI2
HDMI3
PCMCIA
GRUNDIG ELK.
YCR190R-3
V-0
TRANSPORT LINE
V_CUT
V_CUT
V_CUT

SAPPHIRE TARGET SPECIFICATIONS (MPEG2)		26", 32", 37", 40", 42" HD Ready
Concept Properties		
Scaler IC		MStar Sapphire
HD Ready		HD READY
DeInterlacer		3D
Comb Filter		3D
BACK CONNECTIONS		
Antenna		1 (analog reception optional)
Scart		1 (Full)
S-VHS In		-
Video In (RCA)		-
Audio In (2 RCA)		-
Audio Out (2 RCA)		-
Progressive YPbPr In (3 RCA)		1
Progressive Audio In (2 RCA)		1
DVI		-
HDMI		-
PC Audio (L, R)		1
D-Sub 15 (VGA Connector)		1
SPDIF Coaxial		1
Headphone		-
FRONT\SIDE CONNECTIONS		
S-VHS In		1
Video In (RCA)		1
Audio In (2 RCA)		1
HDMI		2 (3 opt)
USB		1 OPT. (cost-up)
CI		1
Headphone		1
VIDEO & GRAPHICS IN\OUT		
CVBS In		2 (1 via RCA, 1 via Scarts)
RF In		1
Y\C In		2 (1 via Scart, 1 via S-VHS)
RGB+FB In-Video		1 through Scart
RGB+HS, VS In -Graphics		1 through DSUB-15
YPbPr In (Progressive)		1
HDMI In		2 (3 OPT.)
YUV In		1
CVBS Out		1 (via scart)
AUDIO IN\OUT		
Stereo L, R In		4 (2 via RCA, 1 via Scart, 1 via PC Headphone)
Stereo L, R Out		2 (1 via scart, 1 via SPDIF output)
Subwoofer Out		NO
S\PDIF In		-
S\PDIF Out		1
Audio Output Power (nominal)		**For 26":** 2x6W **For 32",37",40",42":** 2x10 W
Number of speakers		2 (L+R)

ANALOG FRONT END		
Type		Hybrid Silicon Tuner
Multisystem		Yes
Receiving System		PAL/SECAM BG/DK/I/L/L', NTSC 4.43, 3.58 via scart
Input Freq. Range (MHz)		VHF (48,25-463,25MHz)
		UHF (471,25-855,25MHz)
Tune down to 45,25MHz		YES
Tune up to 855,25MHz		
Input Connector		IEC 169-2, Female
Aerial Input Impedance		75 Ohm (unbalanced)
Tuning System		FST
Tuning Control		PLL
Antenna Loop Through		NO
RF Modulator		NO
Channel Bandwidth		6\7\8 MHz Switchable
ATS (Automatic Tuning System)		Optional in Service Menu
Manual Search		YES
AFT (Auto Fine Tuning)		YES
DIGITAL FRONT END		
Demodulation		ETS 300 744 (DVB-T), COFDM
Hierarchical Modes		Hierarchical - Non hierarchical
Transmission Mode		
Constellations		ALL ALLOWED
Guard Interval		ALL
Input Frequency Range		
Channel Bandwidth		
Input Connector		IEC 169-2, Female
Aerial Input Impedance		75 Ohm (unbalanced)
Signal Level		-80 dBm to -20dBm
Convolutional Code Rates		ALL ALLOWED
Channel Range		
MPEG Transport Stream A/V Decoding		
Transport Stream		Transport of AVC Video ITU-T Rec H.222 / ISO/IEC 13818-1
Profile Level		MPEG-2 MP@ML, MPEG-2 MP@HL,
Aspect Ratio		4:3, 16:9, Pan&Scan, Letterbox
Video Resolution		576i, 576p, 720p, 1080i
Audio Decoding		AC3 (Dolby Digital) - if possible, MPEG1 Layers 1,2
AFD Decoding		YES
CONDITIONAL ACCESS & COMMON INTERFACE		
Common Interface		YES
Embedded Cond. Access		NO
Top Up TV Compliant		YES
Smart Card		NO
VIDEO & GRAPHICS PROCESSING		
Comb Fitler		3D
DLTI, DCTI		YES
Noise Reduction		YES

Sync On Green (SOG) support on graphics		YES
Gamma Correction		YES
Main Picture	**De-interlacing**	3D Frame Based Motion Adaptive
	Noise Reduction	YES
	Scaling	YES
Chroma Decoding	**Analog/Digitized**	Digitized
	Standard	PAL, SECAM, NTSC
Color Controls	**Brightness**	YES
	Contrast	YES
	Color\Saturation	YES
	Color Temperature	YES
	Tint	YES
HDMI Receiver	**HDMI 1.3 Compliant**	YES
	CEC	IF POSSIBLE
	Resolution	Video upto 1080p@60 HZ
	HDCP Support	YES
AV PIP		NO
2 Tuner PIP		-
Txt Pages		Min 100p
Fastext		YES
Toptext		OPT via service menu
VPS/PDC/CNI		YES
WSS		YES
AUDIO PROCESSING		
Standart		BG, DK, L\L', I
(BG, DK, L\L', I, M, N, BTSC)		
Stereo Decoding		YES
(German A2, Nicam, BTSC)		
Dynamic Bass		Opt.
Equalizer		YES
Dual I-II		YES
Surround Effect		Opt.
SRS		Opt. (cost-up)
Effect\Spatial		YES
APPLICATIONS		
Menu System		Beko System, Grundig System
Remote Control		Beko RC, Grundig RC
Supported Menu Languages		**Minimum: Cro, Cze, Dan, Dut, Eng, Fin, Fra, Ger, Hun, Ita, Nor, Pol, Slk, Sln, Spa, Swe, Tur**
Picture Formats (4:3, 16:9, 14:9, Panorama, LetterBox, Subtitle)	**4:3**	YES
	14:9	YES
	16:9	YES
	Panorama	YES
	Letterbox	YES
	Subtitle	YES
	Auto	YES
Number of Program Storage		100 analog / 200 digital
No Ident Timer		YES
Picture Freze		YES

AVL (Automatic Volume Level)		YES
Swap/Zapp		Optional in Service Menu
Child Lock / Panel Lock		YES
Picture Format Switching Through Scart (Pin 8)		YES
Auto RGB Detect Through Scart1 (Pin 16)		YES
DDC Support		YES
Timer		On/Off
Picture Smart Modes		YES
Sound Smart Modes		YES
Simple Hotel Mode		OPT.
Software Update		YES (via VGA)
Wake Up in PC	**Stby to On in PC Mode when last watched is PC**	YES
	Stby to On automatically when PC signal is available	NO
SUPPORTED OUTPUTS		
FOR DISPLAYS		
Single TTL support	**24-bit**	YES
Dual TTL support	**48-bit**	NO
Single 10-bit TTL support	**30-bit**	NO
Dual 10-bit TTL support	**60-bit**	NO
Single LVDS support (8-bit)		YES
Dual LVDS support (8-bit)		YES
Single LVDS support (10-bit)		YES
Dual LVDS support (10-bit)		opt.
Timing Control Support		NO
Balance Board / Inverterless Panel Support		NO
POWER SUPPLY		
PSU Type		Internal
Ratings	**32"**	
	37”	
	40”	
	42”	
Input Range		140V-265V, 50, 60Hz
St-By Power Consumption		< 1W
REGULATIONS		
EMC		EN55020
		EN55013
		EN55022 (with PC)
SAFETY		EN60065
CABINET		
Keyboard	**On\Off (Tact switch)**	YES
	Volume Up	YES
	Volume Down	YES
	Program Up	YES
	Program Down	YES
	Menu	YES
	Source	YES
LED	**Single color/Single Intensity**	YES
	Single Color/Double Intensity	YES

	Multi color	NO
	On Timer Led	NO
VIDEO & GRAPHICS PROCESSING (USB)		
Chroma Decoding		PAL, SECAM, NTSC
Comb Fitler		3D (PAL/NTSC)
MPEG1 Encoding		NO
MPEG2 Encoding		NO
MPEG1 decoding (I frames only)		YES
MPEG2 decoding		YES
MPEG4 decoding (ASP)		YES
DV decoding		YES
MJPEG decoding		YES
MP3 decoding		YES
AAC decoding		YES
WMA decoding		YES
WAV decoding		YES
JPEG decoding		YES
GIF decoding		YES
Output		576p - 720p
APPLICATIONS (USB)		
Screen Saver		Yes
Supported Menu Languages		Supported TV languages
Timer Recording	**Manuel\Automatic**	NO
	Timing Entry Upto	NO
One Touch Recording		NO
VPS/PDC Recording	**(if VBI data given with (CVBS) video signal)**	NO
Record one channel/ watch another		No
Time Shift (Live Pause TV)		No
Fast FWD-REW in Time shift mode		No
Slow FWD-REW in Time shift mode		No
Fast picture search (forward and reverse)		2x / 4x / 8x / 16x / 32x
Slow motion (forward and reverse)		1/2, 1/4, 1/8, 1/16
Still picture		YES
Picture by picture playback		1/2, 1/4, 1/8, 1/16 (forward)
Repeat		Title/chapter/sequence A – B
File Browser		Yes
File editing	**Delete**	Yes
	Splitting	Yes
	Playlist	Yes
	Multi Delete (Title)	Yes
USB Connection 2.0		YES
Upload from PC		YES
External HDD Connection		YES
SUPPORTED FILES (USB)		
.mp3		YES
.wav		YES
.wma		YES
.jpg		YES
.bmp		YES
.png		YES
.gif		NO

.tiff		NO
.3gp		NO
.mov		NO
divx (3/4/5/6.x)		YES
.mpg		YES
.mpe		YES
.vob		YES
.dat		YES
.trp		YES
.ts		YES
.avi		YES
.mp4		YES

SE CHASSI SERVICE MENU PARAMETERS

OPTION 0

STANDBY Customer : Customer mode ; Factory : Factory mode.
TEXT Teletext type : TOP:Toptext Fast :Fastext ; Fast_Top :Fastext and Toptext ;None
TEXT PAGE Number of Text Pages 10 , 250, 1000
TUNER THOMSON_DTT75412_TUNER
PLUG PLAY Demo mode. Will be set as ON after all controls and adjustments are completed.
HDCP VERIFY In Test and Verification process, check "OK" sign after confirmation with the right arrow button on RC.

OPTIONS 1

BLUEBACK Blueback feature ON ; OFF
PANORAMA Panorama feature AVAIL :Available ; NAVAIL :Not Available.
REMOTE CONT Should be set depending on the remote control of the TV set
BEKO 44 Key ; BEKO 50 Key
KEYPAD Keypad type. 6 BUTTON+1STD
HOTEL Simple Otel TV feature AVAIL :Available ; NAVAIL : Not Available
HOTEL VOL Maximum volume level for Otel TV sets. Should be set as 20.

OPTIONS 2

PC AVAIL :Available ; NAVAIL : Not Available
HDMI 1 AVAIL :Available ; NAVAIL : Not Available
HDMI 2 AVAIL :Available ; NAVAIL : Not Available
HDMI 3 AVAIL :Available ; NAVAIL : Not Available
AV AVAIL :Available ; NAVAIL : Not Available
S-Video AVAIL :Available ; NAVAIL : Not Available
SCART AVAIL :Available ; NAVAIL : Not Available
YPbPr AVAIL :Available ; NAVAIL : Not Available
USB AVAIL :Available ; NAVAIL : Not Available
Note: Above items should be set according to the product features.

SOUND OPTIONS

L AVAIL :Available ; NAVAIL : Not Available
Headphone AVAIL :Available ; NAVAIL : Not Available
ATS Automatic Tuning System AVAIL :Available ; NAVAIL : Not Available
Not: For all domestic and all Toshiba-Daewoo-Grundig products set as AVAIL. For other products as NAVAIL unless specified by the customer.
SRS TruSurround AVAIL :Available ; NAVAIL : Not Available
HIDEV MONO Should be set as NAVAIL

IF SETTINGS

VHF AGC :14
UHF AGC :14
LPRIME AGC :14

**** None of the items will be modified in other menus.**

Some of the required IC and Transistor outputs.

IC200		
	ST-BY	ON
1	0,6	0,6
2	1,8	1,8
3	3,3	3,3
4	1,8	1,8

IC803		
	ST-BY	ON
1	0	1,9
2	0	2,6
3	0	0

IC900		
	ST-BY	ON
1	4,95	11,1
2	4,95	11,1
3	0,79	0,79
4	0	0
5	0	0
6	4,95	11,1
7	3,3	3,3
8	0	0

IC901		
	ST-BY	ON
1	0	0
2	1,25	1,25
3	3,17	3,17
4	1,25	1,25

IC902		
	ST-BY	ON
1	0	0
2	0	2,5
3	0	3,6

T701		
	ST-BY	ON
1	0	8,58
2	0	9,25
3	0	11,9
4	0	8,58
5	0	9,25
6	0	11,9

T403		
	ST-BY	ON
1	5,1	5,1
2	3,2	3,2
3	3,3	3,3

T901		
	ST-BY	ON
1	0	3,6
2	0	2,5
3	3,3	3,3

Q901		
	ST-BY	ON
1	0	0
2	0,7	0
3	0	1,45
4	0	0
5	0,7	0
6	0	4,56

T902		
	ST-BY	ON
1	0	10,8
2	0	5,2
3	5,2	5,2

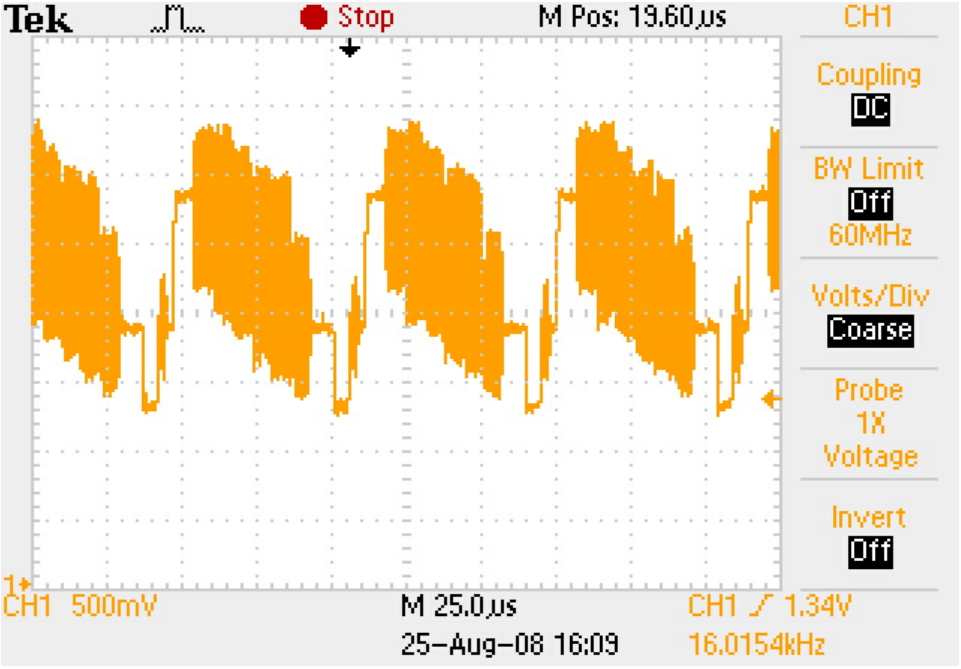
T903 (for 12V panel)		
	ST-BY	ON
1	0	1,08
2	0	11,85
3	0	11,85

IC701		
	ST-BY	ON
1	0	5,17
2	0	0
3	3,3	3,25
4	0	5,15
5	5,2	5,17

Some of the required point oscilloscop outputs

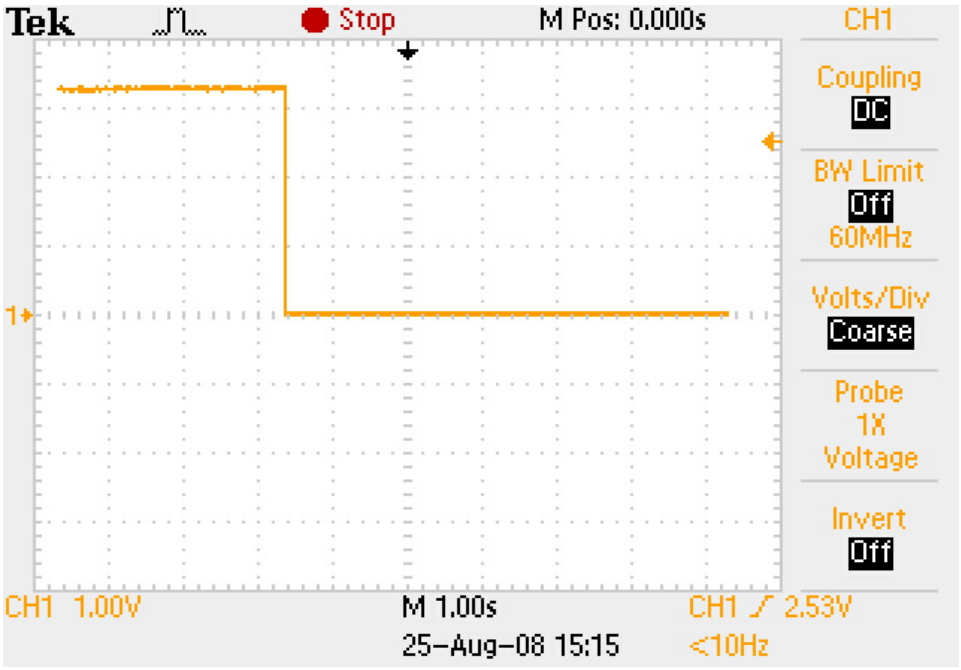
NOT: We applied color bar and 1Khz sound signal at 2010.25 Mhz (PAL-BG-CH10)
Signals may change according to tv' s settings and source.

1) CVBS signal measured on Pin17 of IC300



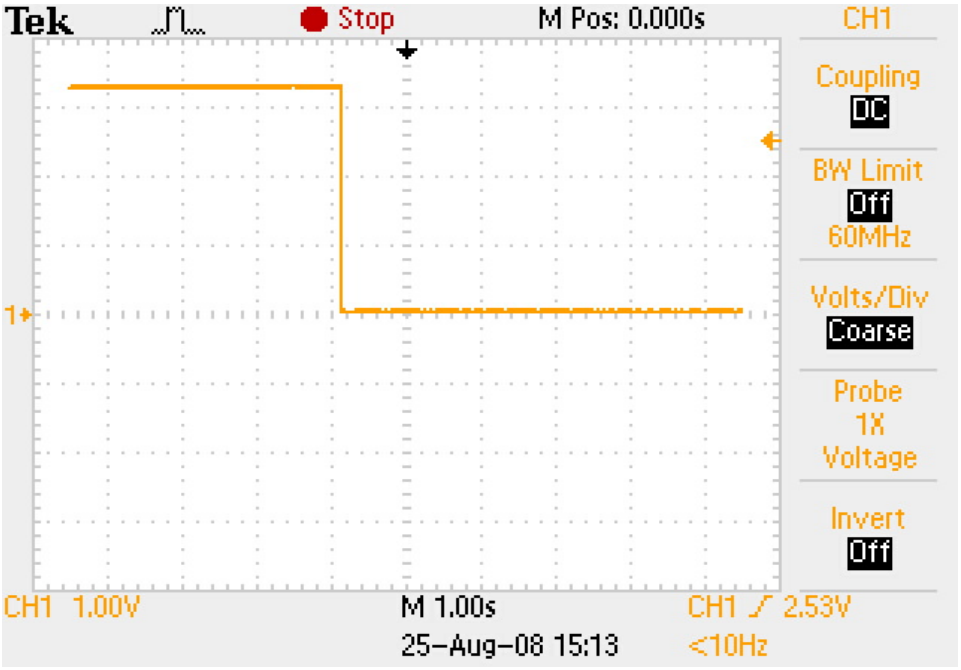
2) VBLCTRL signal measured on R921 to GND.

HIGH: Stand-by
LOW: ON



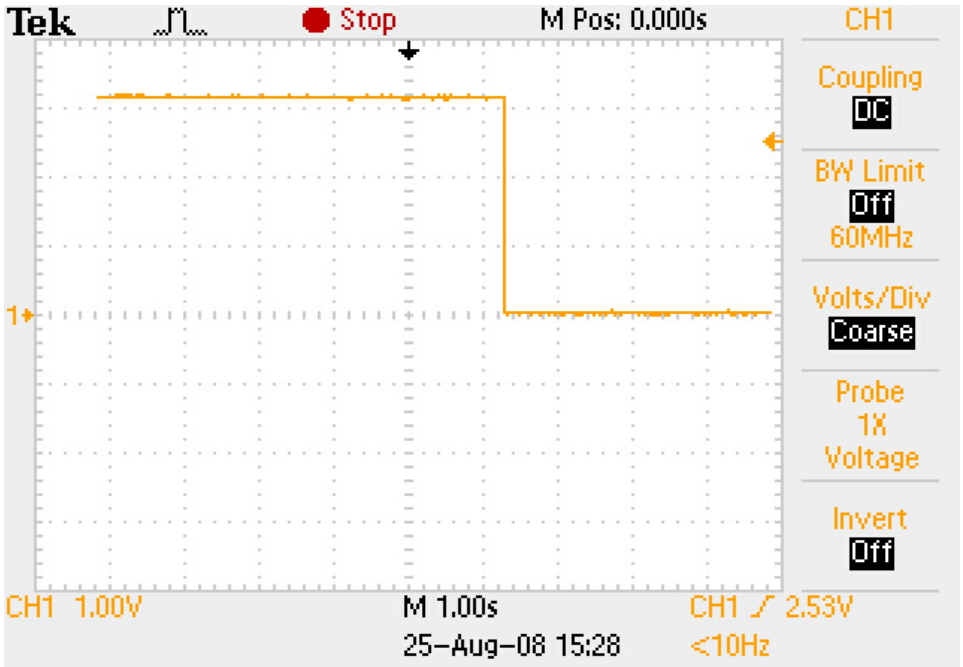
3) POWER-ON/OFF signal measured on R925 to GND.

HIGH: Stand-by
LOW: ON



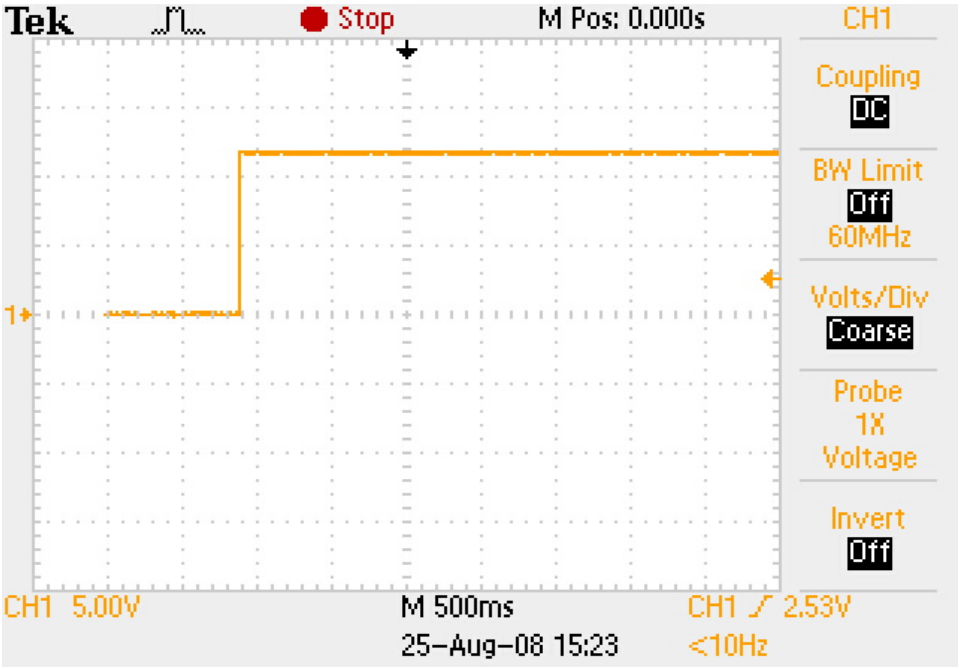
4) PANEL_ON_OFF signal measured on R918 to GND.

HIGH: Stand-by
LOW: ON

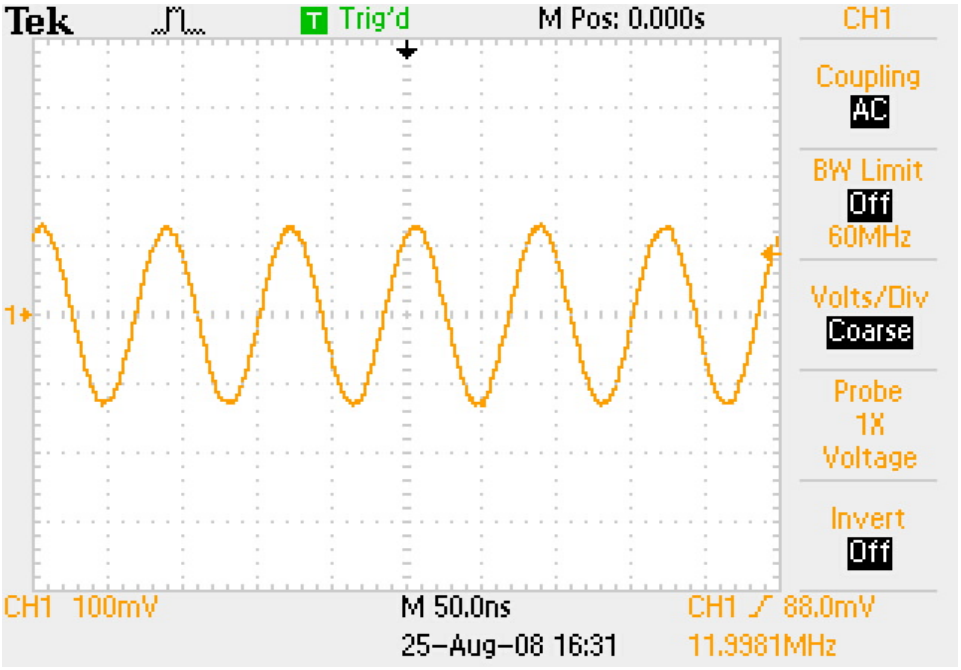


5) PANEL-VCC signal measured on L405 to GND.

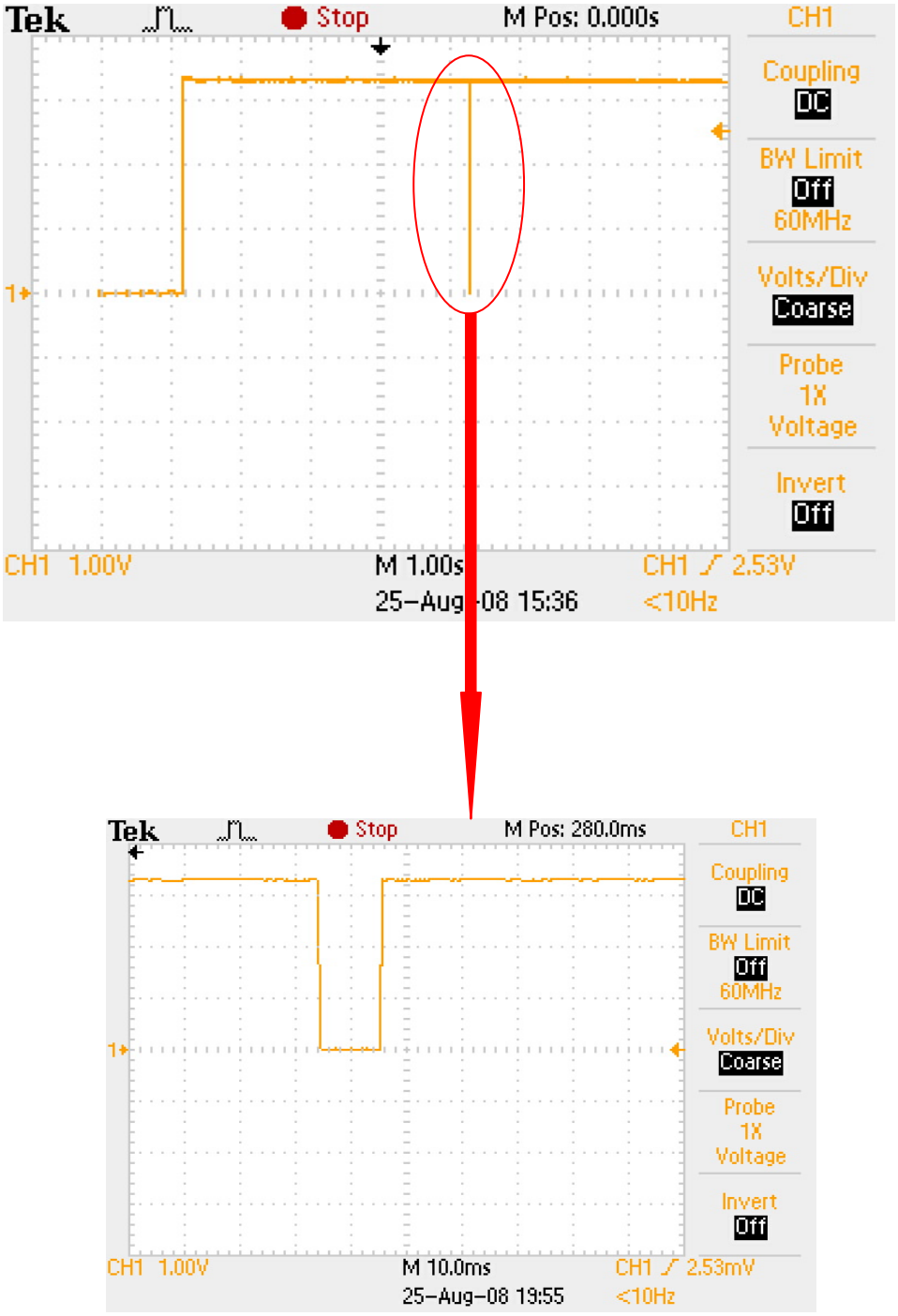
LOW: Stand-by
HIGH: ON



6) Y400 crystal output signal

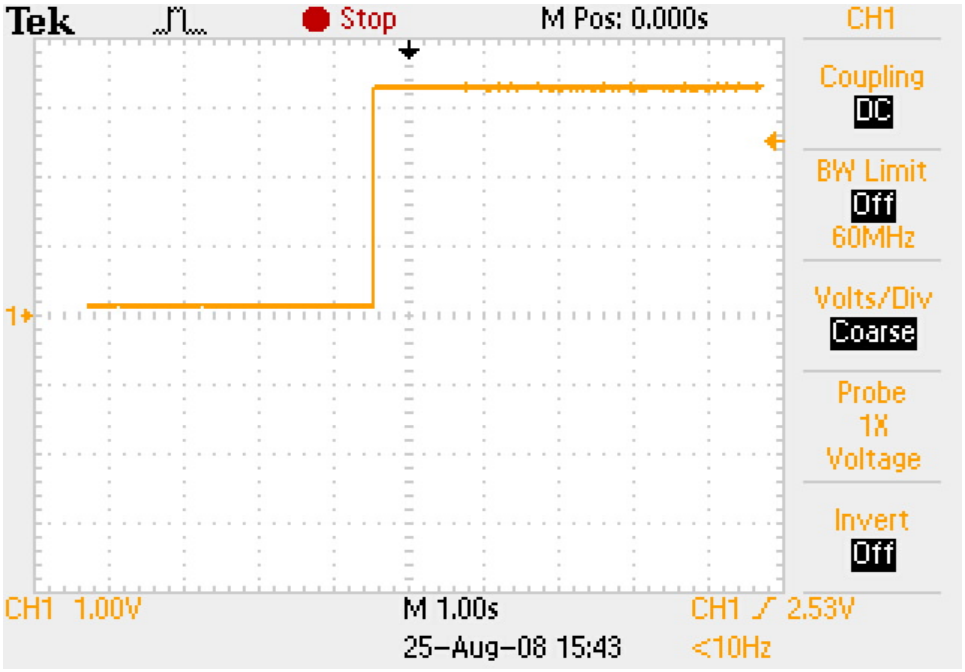


7) RESET signal measured on R483 to GND.



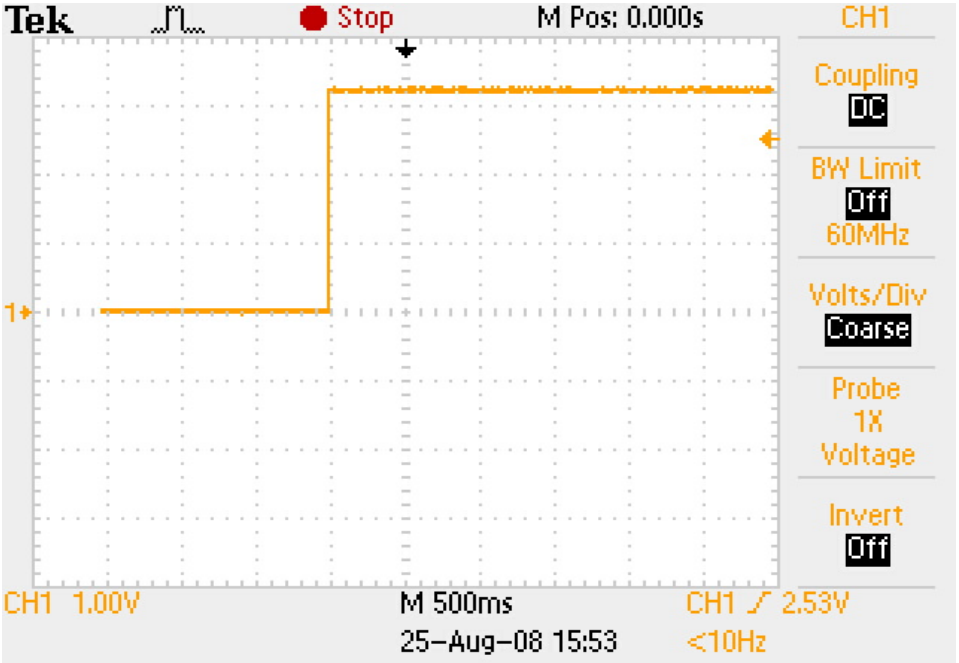
8) AUDIO-ON/OFF signal measured on R431 to GND.

LOW: Stand-by
HIGH: ON

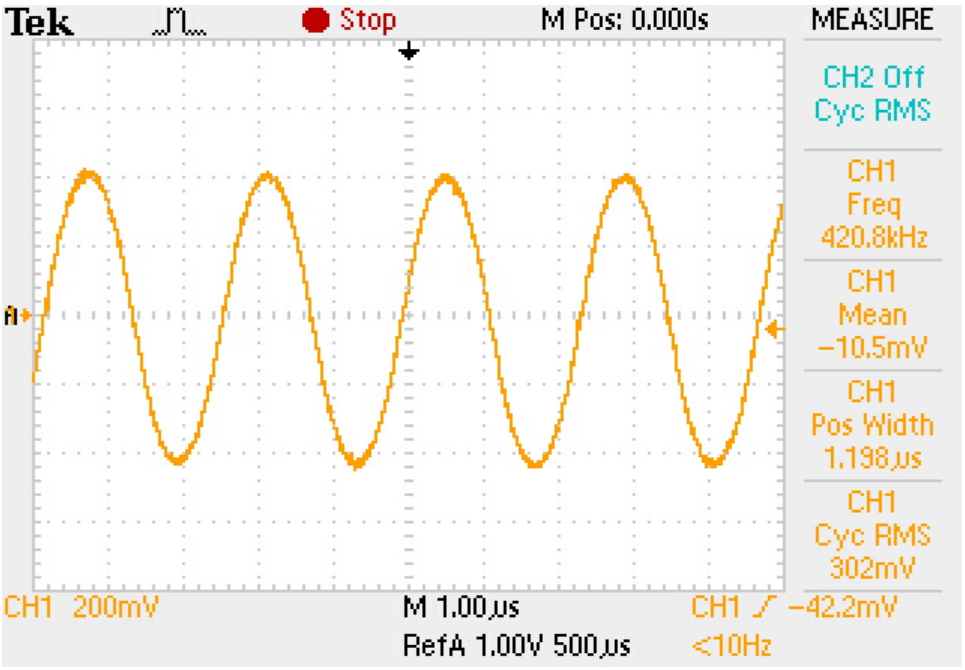


9) MUTE_S signal measured on Pin4 of IC800

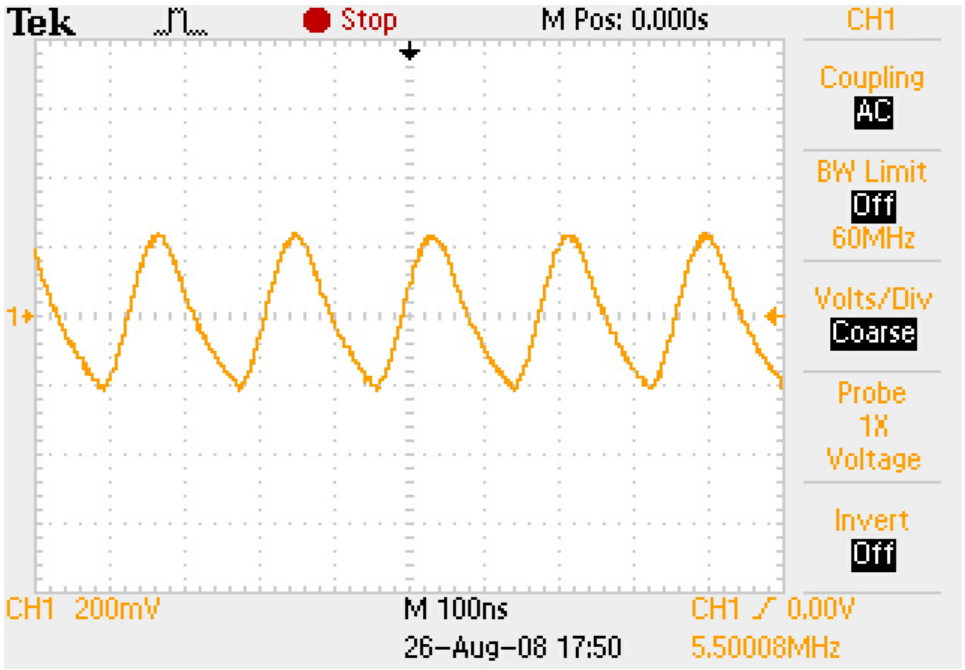
LOW: Sound ON
HIGH: MUTE



10) Speaker output with 1Khz input and 20% volume level



11) SIF signal measured on Pin12 of IC300



Doc. No.: 2007110264

Attention Please: Under the technology license agreement between MStar and Dolby/SRS/BBE, MStar is obliged not to provide samples that incorporate Dolby/SRS/BBE technology to any third party who is not a qualified licensee of Dolby/SRS/BBE.

FEATURES

- Twin-turbo 8051 Micro-controller
  - Twin-turbo 8051 MCU
  - Interrupt controller
  - Supports ISP
  - One full duplex UART
- Transport Stream De-multiplexer
  - Two external TS inputs and one internal TS data path
  - Supports both parallel and serial TS interface, with or without sync signal
  - Maximum TS data rate is 104 Mbps for serial or 13 MB/sec for parallel
  - 32 general purpose PID filters and section filters for each transport stream de-multiplexer
  - One video PES and one audio PES channel
  - Supports MHEG5, DVB subtitle and digital teletext
- MPEG-2 A/V Decoder
  - ISO/IEC 13818-2 MPEG-2 video MP@ML
  - Automatic frame rate conversion
  - Supports resolution in SDTV
  - MPEG-1, MPEG-2 (Layer I/II), and Dolby[1] Digital (AC-3) audio decoder
- MPEG-4 Decoder
  - Supports ISO/IEC 14496-2 MPEG-4 ASP video decoding
  - Supports resolution up to D1
- NTSC/PAL/SECAM Video Decoder
  - Supports NTSC-M, NTSC-J, NTSC-4.43, PAL (B,D,G,H,M,N,I,Nc), and SECAM
  - Automatic TV standard detection
  - Motion adaptive 3-D comb filter for NTSC/PAL
  - 8 configurable CVBS & Y/C S-video inputs
  - Supports Teletext level-1.5, Closed Caption (analog CC 608/analog CC 708/digital CC 608/digital CC 708), V-chip and SCTE
  - Macrovision detection
  - CVBS video output
- Multi-Standard TV Sound Processor
  - Supports BTSC/A2/EIA-J demodulation in NTSC and A2/NICAM/FM/AM demodulation in PAL
  - Supports MTS Mode MONO/STEREO/SAP in BTSC/EIA-J and MONO/STEREO/DUAL in A2/NICAM
  - L/Rx4 and SIF audio input
  - L/R speaker and 2 additional L/R audio line-out
  - Built-in audio output DAC's
  - Audio processing for loudspeaker channel, including volume, balance, mute, tone, EQ, virtual stereo/surround, and treble/bass
  - Optional advanced surround available (Dolby, SRS[2], BBE[3]... etc) **Note**
- Digital Audio Interface
  - HDMI audio channel processing capability
  - Programmable delay for audio/video synchronization
- Analog RGB Compliant Input Ports
  - Two analog ports support up to 1080P
  - Supports PC RGB input up to SXGA@75Hz
  - Supports HDTV RGB/YPbPr/YCbCr
  - Supports Composite Sync and SOG (Sync-on-Green) separator
  - Automatic color calibration
- High-Performance Scaling Engine
  - Fully Programmable shrink/zoom capabilities
  - Nonlinear video scaling supports various modes including Panorama
- DVI/HDCP/HDMI Compliant Input Port
  - Supports up to 225MHz @ 1080P 60Hz with 12-bit deep-color resolution
  - Single link on-chip DVI 1.0 compliant receiver
  - High-bandwidth Digital Content Protection (HDCP) 1.1 compliant receiver
  - High Definition Multimedia Interface (HDMI) 1.3 compliant receiver with CEC (Consumer Electronics Control) support
  - Long-cable tolerant robust receiving

[1] **Trademark of Dolby Laboratories**

[2] **Trademark of SRS Labs, Inc.**

[3] **Registered trademark of BBE Sound, Inc.**

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- Auto-Configuration/Auto-Detection
  - Auto input signal format and mode detection
  - Auto-tuning function including phasing, positioning, offset, gain, and jitter detection
  - Sync Detection for H/V Sync
- Video Processing & Conversion
  - 3-D motion adaptive video de-interlacers with edge-oriented adaptive algorithm for smooth low-angle edges
  - Automatic 3:2 pull-down & 2:2 pull-down detection and recovery
  - MStar 3rd Generation Advanced Color Engine (MStarACE-3) automatic picture enhancement gives:
    - Brilliant and fresh color
    - Intensified contrast and details
    - Vivid skin tone
    - Sharp edge
    - Enhanced depth of field perception
    - Accurate and independent color control
  - sRGB compliance allows end-user to experience the same colors as viewed on CRTs and other displays
  - 3-channel gamma curve adjustment
  - Programmable 10-bit RGB gamma CLUT
  - 3-D video noise reduction
  - Frame rate conversion
- Output Interface
  - Supports up to 8-bit dual LVDS UXGA/WSXGA+ panel interface
  - Supports 2 data output formats: Thine & TI data mappings
  - Compatible with TIA/EIA
  - With 6/8 bits options
  - Spread spectrum output frequency for EMI suppression
- CVBS Video Output
  - Supports CVBS/S-video bypass output
  - Built-in video encoder for encoding digital video into CVBS output
- 2D Graphics Engine
  - Point draw, line draw, rectangle draw/fill and text draw
  - BitBlt and stretch BitBlt
  - Raster Operation (ROP)
- Miscellaneous
  - DRAM controller to support up to 16-bit DDR interface
  - Supports Common Interface for conditional access
  - SPI bus for external flash
  - USB 2.0 host controller with the flexibility for connecting external storage devices
  - 256-LQFP package
  - Operating at 1.2V (core), 2.5V (DDR), and 3.3V (I/O and analog)

Note: Please see Ordering Guide for details on advanced surround.

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GENERAL DESCRIPTION

The MSD2338AL is a highly integrated controller IC for LCD/PDP DTV applications with resolutions up to UXGA/WSXGA+. It is configured with an integrated triple-ADC/PLL, a multi-standard TV video and audio decoder, a motion adaptive video de-interlacer, a scaling engine, the MStarACE-3 color engine, an advanced 2D graphics engine, a transport processor, a standard-definition (SD) MPEG video decoder, a 24-bit DSP for MPEG audio decoding, a DVI/HDCP/HDMI receiver, and a peripheral control unit providing a variety of HDTV control functions.

The MSD2338AL comprises an MPEG-2 transport processor with advanced section filtering capability, an MPEG-2 (MP@ML profile) video decoder, an MPEG layer I and II digital audio decoder with analog audio outputs that are designed to support DVB SDTV programs while handling conditional access. Furthermore, it is also possible to decode MPEG-4, JPEG, MP3 formats from external sources such as USB interfaces.

For analog TV, the MSD2338AL includes NTSC/PAL/SECAM multi-standard video decoder comprising a 3-D motion adaptive comb filter and time-based correction, and a NICAM/A2 audio decoder to support worldwide television standards. The MSD2338AL is also configured with a VBI processor to decode digital information such as Close Caption/V-chip/teletext/WSS/CGMS-A/VPS. In addition, the MStar advanced LCD TV processor enhances video quality, motion adaptive de-interlacer, picture quality adjustment units, and MStarACE-3 color engine.

By integrating peripherals including USB 2.0 host controller, UART, IR, SPI, I2C, and PWM, the MSD2338AL fulfills all requirements in advanced DTV sets. To further reduce system costs, the MSD2338AL also integrates intelligent power management control capability for green-mode requirements and spread-spectrum support for EMI management.

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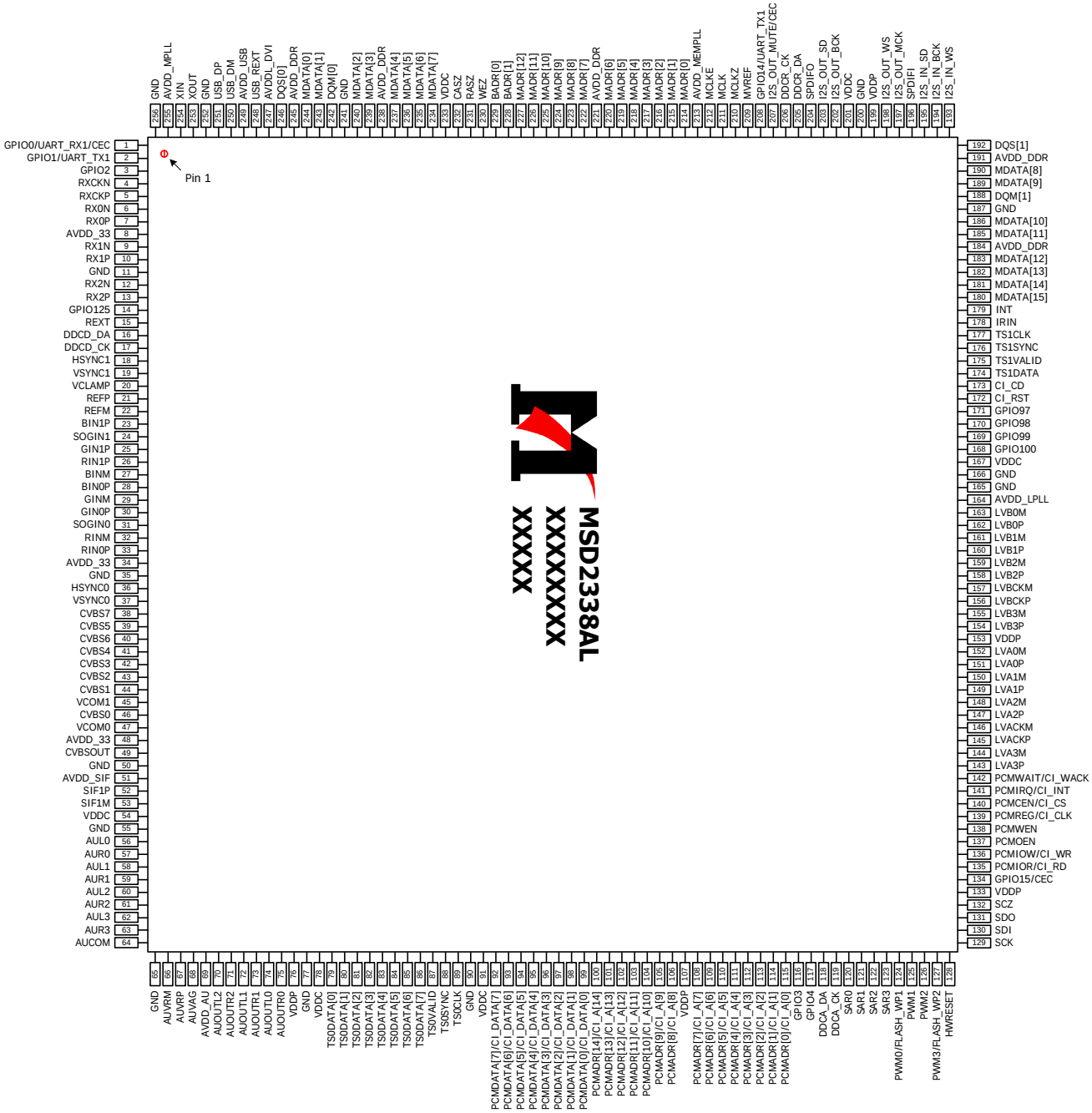
PIN DIAGRAM (MSD2338AL)



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PIN DESCRIPTION

Analog Interface

Pin Name	Pin Type	Function	Pin
VCLAMP		CVBS/YC Mode Clamp Voltage Bypass	20
REFP		Internal ADC Top De-coupling Pin	21
REFM		Internal ADC Bottom De-coupling Pin	22
REXT	Analog Input	External Resister 390 ohm to AVDD_33	15
BIN1P	Analog Input	Analog Blue Input from Channel 1	23
SOGIN1	Analog Input	Sync-On-Green input from Channel 1	24
GIN1P	Analog Input	Analog Green Input from Channel 1	25
RIN1P	Analog Input	Analog Red Input from Channel 1	26
BINM	Analog Input	Reference Ground for Analog Blue Input	27
BIN0P	Analog Input	Analog Blue Input from Channel 0	28
GINM	Analog Input	Reference Ground for Analog Green Input	29
GIN0P	Analog Input	Analog Green Input from Channel 0	30
SOGIN0	Analog Input	Sync-On-Green Input from Channel 0	31
RINM	Analog Input	Reference Ground for Analog Red Input	32
RIN0P	Analog Input	Analog Red Input from Channel 0	33
HSYNC1	Schmitt Trigger Input w/ 5V-tolerant	HSYNC/Composite Sync for VGA Input from channel 1	18
VSYNC1	Schmitt Trigger Input w/ 5V-tolerant	VSYNC for VGA Input from channel 1	19
HSYNC0	Schmitt Trigger Input w/ 5V-tolerant	HSYNC/Composite Sync for VGA Input from channel 0	36
VSYNC0	Schmitt Trigger Input w/ 5V-tolerant	VSYNC for VGA Input from channel 0	37

Analog Video Input/Output Interface

Pin Name	Pin Type	Function	Pin
VCOM1	Analog Input	CVBS Video Input Reference Ground	45
VCOM0	Analog Input	CVBS Video Input Reference Ground	47
CVBS7	Analog Input	CVBS (Composite) Video Input Channel 7	38
CVBS5	Analog Input	CVBS (Composite) Video Input Channel 5	39
CVBS6	Analog Input	CVBS (Composite) Video Input Channel 6	40
CVBS4	Analog Input	CVBS (Composite) Video Input Channel 4	41
CVBS3	Analog Input	CVBS (Composite) Video Input Channel 3	42

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Doc. No.: 2007110264

Attention Please: Under the technology license agreement between MStar and Dolby/SRS/BBE, MStar is obliged not to provide samples that incorporate Dolby/SRS/BBE technology to any third party who is not a qualified licensee of Dolby/SRS/BBE.

FEATURES

- Twin-turbo 8051 Micro-controller
  - Twin-turbo 8051 MCU
  - Interrupt controller
  - Supports ISP
  - One full duplex UART
- Transport Stream De-multiplexer
  - Two external TS inputs and one internal TS data path
  - Supports both parallel and serial TS interface, with or without sync signal
  - Maximum TS data rate is 104 Mbps for serial or 13 MB/sec for parallel
  - 32 general purpose PID filters and section filters for each transport stream de-multiplexer
  - One video PES and one audio PES channel
  - Supports MHEG5, DVB subtitle and digital teletext
- MPEG-2 A/V Decoder
  - ISO/IEC 13818-2 MPEG-2 video MP@ML
  - Automatic frame rate conversion
  - Supports resolution in SDTV
  - MPEG-1, MPEG-2 (Layer I/II), and Dolby[1] Digital (AC-3) audio decoder
- MPEG-4 Decoder
  - Supports ISO/IEC 14496-2 MPEG-4 ASP video decoding
  - Supports resolution up to D1
- NTSC/PAL/SECAM Video Decoder
  - Supports NTSC-M, NTSC-J, NTSC-4.43, PAL (B,D,G,H,M,N,I,Nc), and SECAM
  - Automatic TV standard detection
  - Motion adaptive 3-D comb filter for NTSC/PAL
  - 8 configurable CVBS & Y/C S-video inputs
  - Supports Teletext level-1.5, Closed Caption (analog CC 608/analog CC 708/digital CC 608/digital CC 708), V-chip and SCTE
  - Macrovision detection
  - CVBS video output
- Multi-Standard TV Sound Processor
  - Supports BTSC/A2/EIA-J demodulation in NTSC and A2/NICAM/FM/AM demodulation in PAL
  - Supports MTS Mode MONO/STEREO/SAP in BTSC/EIA-J and MONO/STEREO/DUAL in A2/NICAM
  - L/Rx4 and SIF audio input
  - L/R speaker and 2 additional L/R audio line-out
  - Built-in audio output DAC's
  - Audio processing for loudspeaker channel, including volume, balance, mute, tone, EQ, virtual stereo/surround, and treble/bass
  - Optional advanced surround available (Dolby, SRS[2], BBE[3]... etc) **Note**
- Digital Audio Interface
  - HDMI audio channel processing capability
  - Programmable delay for audio/video synchronization
- Analog RGB Compliant Input Ports
  - Two analog ports support up to 1080P
  - Supports PC RGB input up to SXGA@75Hz
  - Supports HDTV RGB/YPbPr/YCbCr
  - Supports Composite Sync and SOG (Sync-on-Green) separator
  - Automatic color calibration
- High-Performance Scaling Engine
  - Fully Programmable shrink/zoom capabilities
  - Nonlinear video scaling supports various modes including Panorama
- DVI/HDCP/HDMI Compliant Input Port
  - Supports up to 225MHz @ 1080P 60Hz with 12-bit deep-color resolution
  - Single link on-chip DVI 1.0 compliant receiver
  - High-bandwidth Digital Content Protection (HDCP) 1.1 compliant receiver
  - High Definition Multimedia Interface (HDMI) 1.3 compliant receiver with CEC (Consumer Electronics Control) support
  - Long-cable tolerant robust receiving

[1] **Trademark of Dolby Laboratories**

[2] **Trademark of SRS Labs, Inc.**

[3] **Registered trademark of BBE Sound, Inc.**

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Pin Name	Pin Type	Function	Pin
AUOUTL0	Analog Output	Main Audio Output Left Channel 0	74
AUOUTR0	Analog Output	Main Audio Output Right Channel 0	75
AUCOM	Analog Input	Reference Ground for Audio Line Input	64

Common Interface

Pin Name	Pin Type	Function	Pin
PCMDATA[7:0]/ CI_DATA[7:0]	I/O	PCMCIA Data[7:0] / Common Interface Data[7:0]	92-99
PCMADR[14:0]/ CI_A[14:0]	Output	PCMCIA Address[14:0] / Common Interface Address[14:0]	100-106, 108-115
PCMIOR/ CI_RD	Output	PCMCIA Input/Output Read / Common Interface Read	135
PCMIOW/ CI_WR	Output	PCMCIA Input/Output Write / Common Interface Write	136
PCMOEN	Output	PCMCIA Output Enable	137
PCMWEN	Output	PCMCIA Write Enable	138
PCMREG/ CI_CLK	Output	PCMCIA Register / Common Interface Clock	139
PCMCEN/ CI_CS	Output	PCMCIA Card Enable / Common Interface Chip Select	140
PCMIRQ/ CI_INT	Input	PCMCIA Interrupt Request / Common Interface Interrupt	141
PCMWAIT/ CI_WACK	Input	PCMCIA Extend Bus Wait Cycle / Common Interface Wait Acknowledge	142
CI_RST	Output	Common Interface Reset	172
CI_CD	Input	Common Interface Card Detect	173

TS Input Interface

Pin Name	Pin Type	Function	Pin
TS0CLK	Input w/ 5V-tolerant	TS Clock	89
TS0DATA[7:0]	Input w/ 5V-tolerant	TS Data in Parallel; LSB (bit 0) is for serial TS data	86-79
TS0VALID	Input w/ 5V-tolerant	TS Data Valid	87
TS0SYNC	Input w/ 5V-tolerant	TS Sync-Byte Indicator	88
TS1CLK	Input w/ 5V-tolerant	2nd TS Clock	177
TS1DATA	Input w/ 5V-tolerant	2nd TS Data in Parallel	174
TS1VALID	Input w/ 5V-tolerant	2nd TS Data Valid	175
TS1SYNC	Input w/ 5V-tolerant	2nd TS Sync-Byte Indicator	176

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DVI/HDMI Interface

Pin Name	Pin Type	Function	Pin
RX0N	Input	DVI/HDMI Channel 0 Negative Data Input	6
RX0P	Input	DVI/HDMI Channel 0 Positive Data Input	7
RX1N	Input	DVI/HDMI Channel 1 Negative Data Input	9
RX1P	Input	DVI/HDMI Channel 1 Positive Data Input	10
RX2N	Input	DVI/HDMI Channel 2 Negative Data Input	12
RX2P	Input	DVI/HDMI Channel 2 Positive Data Input	13
RXCKN	Input	DVI/HDMI Negative Clock Input	4
RXCKP	Input	DVI/HDMI Positive Clock Input	5

LVDS Interface

Pin Name	Pin Type	Function	Pin
LVA0M	Output	LVDS A-Link Channel 0 Negative Data Output	152
LVA0P	Output	LVDS A-Link Channel 0 Positive Data Output	151
LVA1M	Output	LVDS A-Link Channel 1 Negative Data Output	150
LVA1P	Output	LVDS A-Link Channel 1 Positive Data Output	149
LVA2M	Output	LVDS A-Link Channel 2 Negative Data Output	148
LVA2P	Output	LVDS A-Link Channel 2 Positive Data Output	147
LVACKM	Output	LVDS A-Link Negative Clock Output	146
LVACKP	Output	LVDS A-Link Positive Clock Output	145
LVA3M	Output	LVDS A-Link Channel 3 Negative Data Output	144
LVA3P	Output	LVDS A-Link Channel 3 Positive Data Output	143
LVB0M	Output	LVDS B-Link Channel 0 Negative Data Output	163
LVB0P	Output	LVDS B-Link Channel 0 Positive Data Output	162
LVB1M	Output	LVDS B-Link Channel 1 Negative Data Output	161
LVB1P	Output	LVDS B-Link Channel 1 Positive Data Output	160
LVB2M	Output	LVDS B-Link Channel 2 Negative Data Output	159
LVB2P	Output	LVDS B-Link Channel 2 Positive Data Output	158
LVBCKM	Output	LVDS B-Link Negative Clock Output	157
LVBCKP	Output	LVDS B-Link Positive Clock Output	156
LVB3M	Output	LVDS B-Link Channel 3 Negative Data Output	155
LVB3P	Output	LVDS B-Link Channel 3 Positive Data Output	154

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Serial Flash Interface

Pin Name	Pin Type	Function	Pin
SCK	Output	SPI Flash Serial Clock	129
SDI	Output	SPI Flash Serial Data Input	130
SDO	Input w/ 5V-tolerant	SPI Flash Serial Data Output	131
SCZ	Output	SPI Flash Chip Select	132
IRIN	Input w/ 5V-tolerant	IR Receiver Input	178
INT	Input w/ 5V-tolerant	MCU Bus Interrupt; 4mA driving strength	179

GPIO Interface

Pin Name	Pin Type	Function	Pin
GPIO125	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	14
GPIO100	I/O	General Purpose Input/Output; 4mA driving strength	168
GPIO99	I/O	General Purpose Input/Output; 4mA driving strength	169
GPIO98	I/O	General Purpose Input/Output; 4mA driving strength	170
GPIO97	I/O	General Purpose Input/Output; 4mA driving strength	171
GPIO15/CEC	I/O	General Purpose Input/Output; 4mA driving strength	134
GPIO14/ UART_TX1	I/O	General Purpose Input/Output; 4mA driving strength / Universal Asynchronous Transmitter	208
GPIO4	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	117
GPIO3	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	116
GPIO2	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength	3
GPIO1/ UART_TX1	I/O w/ 5V-tolerant	General Purpose Input/Output; 4mA driving strength / Universal Asynchronous Transmitter	2
GPIO0/ UART_RX1/ CEC	I/O	General Purpose Input/Output; 4mA driving strength / Universal Asynchronous Receiver / Consumer Electronics Control	1
PWM3/ FLASH_WP2	Output	Pulse Width Modulation Output; 4mA driving strength / Flash Write Protect 2	127
PWM2	Output	Pulse Width Modulation Output; 4mA driving strength	126
PWM1	Output	Pulse Width Modulation Output; 4mA driving strength	125
PWM0/ FLASH_WP1	Output	Pulse Width Modulation Output; 4mA driving strength / Flash Write Protect 1	124
SAR3	Analog Input	SAR Low Speed ADC Input 3; General Purpose Input/Output	123
SAR2	Analog Input	SAR Low Speed ADC Input 2; General Purpose Input/Output	122

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Pin Name	Pin Type	Function	Pin
SAR1	Analog Input	SAR Low Speed ADC Input 1; General Purpose Input/Output	121
SAR0	Analog Input	SAR Low Speed ADC Input 0; General Purpose Input/Output	120

DRAM Interface

Pin Name	Pin Type	Function	Pin
DQM[1:0]	Output	Data Mask for Low Byte; active high	188, 242
DQS[1:0]	I/O	Data Strobe	192, 246
MVREF	Input	Reference Voltage for DDR SDRAM Interface	209
MCLKZ	Output	DRAM Memory Negative Differential Clock	210
MCLK	Output	DRAM Memory Positive Differential Clock	211
MCLKE	Output	DRAM Memory Clock Enable	212
BADR[1:0]	Output	DRAM Memory Bank Address	228, 229
WEZ	Output	Write Enable; active low	230
RASZ	Output	Row Address Strobe; active low	231
CASZ	Output	Column Address Strobe; active low	232
MDATA[15:0]	I/O	DRAM Memory Data Bus	180-183, 185, 186, 189, 190, 234-237, 239, 240, 243, 244
MADR[12:0]	Output	DRAM Memory Address	227-222, 220-214

USB Interface

Pin Name	Pin Type	Function	Pin
USB_REXT		USB External Resistor Pin; Connected through 910 ohm (±1%) Resistor to GND (Pin #252)	248
USB_DM	Analog I/O	USB Inverting Data Input/Output	250
USB_DP	Analog I/O	USB Non Inverting Data Input/Output	251

Misc. Interface

Pin Name	Pin Type	Function	Pin
DDCD_DA	I/O w/ 5V-tolerant	HDCP Serial Bus Data/DDC Data of DVI/HDMI Port	16
DDCD_CK	Input w/ 5V-tolerant	HDCP Serial Bus Clock/DDC Clock of DVI/HDMI Port	17
DDCA_DA	I/O w/ 5V-tolerant	DDC Data for Analog Port	118
DDCA_CK	I/O w/ 5V-tolerant	DDC Clock for Analog Port	119

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Pin Name	Pin Type	Function	Pin
HWRESET	Schmitt Trigger Input w/ 5V-tolerant	Hardware Reset; active high	128
DDCR_DA	I/O w/ 5V-tolerant	DDC Data for ROM	205
DDCR_CK	I/O w/ 5V-tolerant	DDC Clock for ROM	206
XIN	Analog Input	Crystal Oscillator Input	254
XOUT	Analog Output	Crystal Oscillator Output	253

Power Pins

Pin Name	Pin Type	Function	Pin
AVDD_SIF	3.3V Power	SIF Power	51
AVDD_AU	3.3V Power	Audio Power	69
AVDD_DDR	2.5V Power	DDR Power	184, 191, 221, 238, 245
AVDD_LPLL	3.3V Power	LPLL Power	164
AVDD_MPLL	3.3V Power	MPLL Power	255
AVDD_MEMPLL	3.3V Power	PLL Power	213
AVDD_33	3.3V Power	ADC Power	8, 34, 48
AVDDL_DVI	1.2V Power	DVI Power	247
AVDD_USB	3.3V Power	USB Power	249
VDDC	1.26V Power	Digital Core Power	54, 78, 91, 167, 201, 233
VDDP	3.3V Power	Digital Input/Output Power	76, 107, 133, 153, 199
GND	Ground	Ground	11, 35, 50, 55, 65, 77, 90, 165, 166, 187, 200, 241, 252, 256

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ELECTRICAL SPECIFICATIONS

Analog Interface Characteristics

Parameter	Min	Typ	Max	Unit
VIDEO ADC Resolution		10		Bits
DC ACCURACY				
Differential Nonlinearity		TBD	TBD	LSB
Integral Nonlinearity		TBD		LSB
VIDEO ANALOG INPUT				
Input Voltage Range				
Minimum			0.5	V p-p
Maximum	1.0			V p-p
Input Bias Current			1	uA
Input Full-Scale Matching		1.5		%FS
Brightness Level Adjustment		62		%FS
SWITCHING PERFORMANCE				
Maximum Conversion Rate	150			MSPS
Minimum Conversion Rate			12	MSPS
HSYNC Input Frequency	15		200	kHz
PLL Clock Rate	12		150	MHz
PLL Jitter		500		ps p-p
Sampling Phase Tempco		15		ps/°C
DYNAMIC PERFORMANCE				
Analog Bandwidth, Full Power		250		MHz
DIGITAL INPUTS				
Input Voltage, High (V_{IH})	2.5			V
Input Voltage, Low (V_{IL})			0.8	V
Input Current, High (I_{IH})			-1.0	uA
Input Current, Low (I_{IL})			1.0	uA
Input Capacitance		5		pF
DIGITAL OUTPUTS				
Output Voltage, High (V_{OH})	VDDP-0.1			V
Output Voltage, Low (V_{OL})			0.1	V
VIDEO ANALOG OUTPUT				
CVBS Buffer Output				
Output Low		1.5		V
Output High		2.0		V

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Parameter	Min	Typ	Max	Unit
AUDIO				
ADC Input		2.0		V p-p
DAC Output		2.0		V p-p
SIF Input Range				
Minimum			0.1	V p-p
Maximum	1.0			V p-p
FSSW Input[1]	0		1.8	V
SAR ADC Input	0		3.3	V
FB ADC Input[2]	0		1.25	V

Specifications subject to change without notice.

Notes:

1. **Input full scale is typically 1.8V, but input range is 0 ~ 3.3V.**
2. **Input full scale is 1.25V, but input range is 0 ~ 3.3V.**

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units
3.3V Supply Voltages	V_{VDD_33}	-0.3		3.6	V
2.5V Supply Voltages	$V_{VDD\ 25}$	-0.3		2.75	V
1.2V Supply Voltages	V_{VDD_12}	-0.3		1.32	V
Input Voltage (5V tolerant inputs)	$V_{IN5Vtol}$	-0.3		5.0	V
Input Voltage (non 5V tolerant inputs)	V_{IN}	-0.3		V_{VDD_33}	V
Ambient Operating Temperature	T_A	0		70	°C
Storage Temperature	T_{STG}	-40		150	°C
Junction Temperature	T_J			150	°C
Thermal Resistance (Junction to Air) Natural Conversion	θ_{JA}		TBD		°C/W
Thermal Resistance (Junction to Case) Natural Conversion	θ_{JC}		TBD		°C/W

Note: Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and does not imply functional operation of the device. Exposure to absolute maximum ratings for extended periods may affect device reliability.

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ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
MSD2338AL	0°C to +70°C	LQFP	256
MSD2338AL-LF	0°C to +70°C	LQFP	256
MSD2338AL-S1	0°C to +70°C	LQFP	256
MSD2338AL-LF-S1	0°C to +70°C	LQFP	256
MSD2338AL-S2	0°C to +70°C	LQFP	256
MSD2338AL-LF-S2	0°C to +70°C	LQFP	256
MSD2338AL-S3	0°C to +70°C	LQFP	256
MSD2338AL-LF-S3	0°C to +70°C	LQFP	256
MSD2338AL-S4	0°C to +70°C	LQFP	256
MSD2338AL-LF-S4	0°C to +70°C	LQFP	256
MSD2338AL-S5	0°C to +70°C	LQFP	256
MSD2338AL-LF-S5	0°C to +70°C	LQFP	256

Note on product suffix:
1. "LF": Lead-free version.
2. "S1" ~ "S5": Advanced surround features.

Code	Description
S1	SRS TruSurround XT™
S2	Dolby® ProLogic® II + Dolby® Virtual Speaker
S3	Dolby® ProLogic® II + Virtual Dolby® Surround
S4	BBE® Digital
S5	BBE® ViVA™

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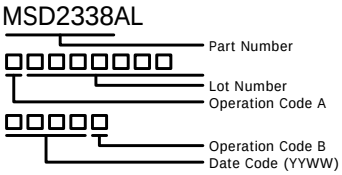
MARKING INFORMATION



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Electrostatic charges accumulate on both test equipment and human body and can discharge without detection. MSD2338AL comes with ESD protection circuitry; however, the device may be permanently damaged when subjected to high energy discharges. The device should be handled with proper ESD precautions to prevent malfunction and performance degradation.

REVISION HISTORY

Document	Description	Date
MSD2338AL_ds_v01	• Initial release	Nov 2007

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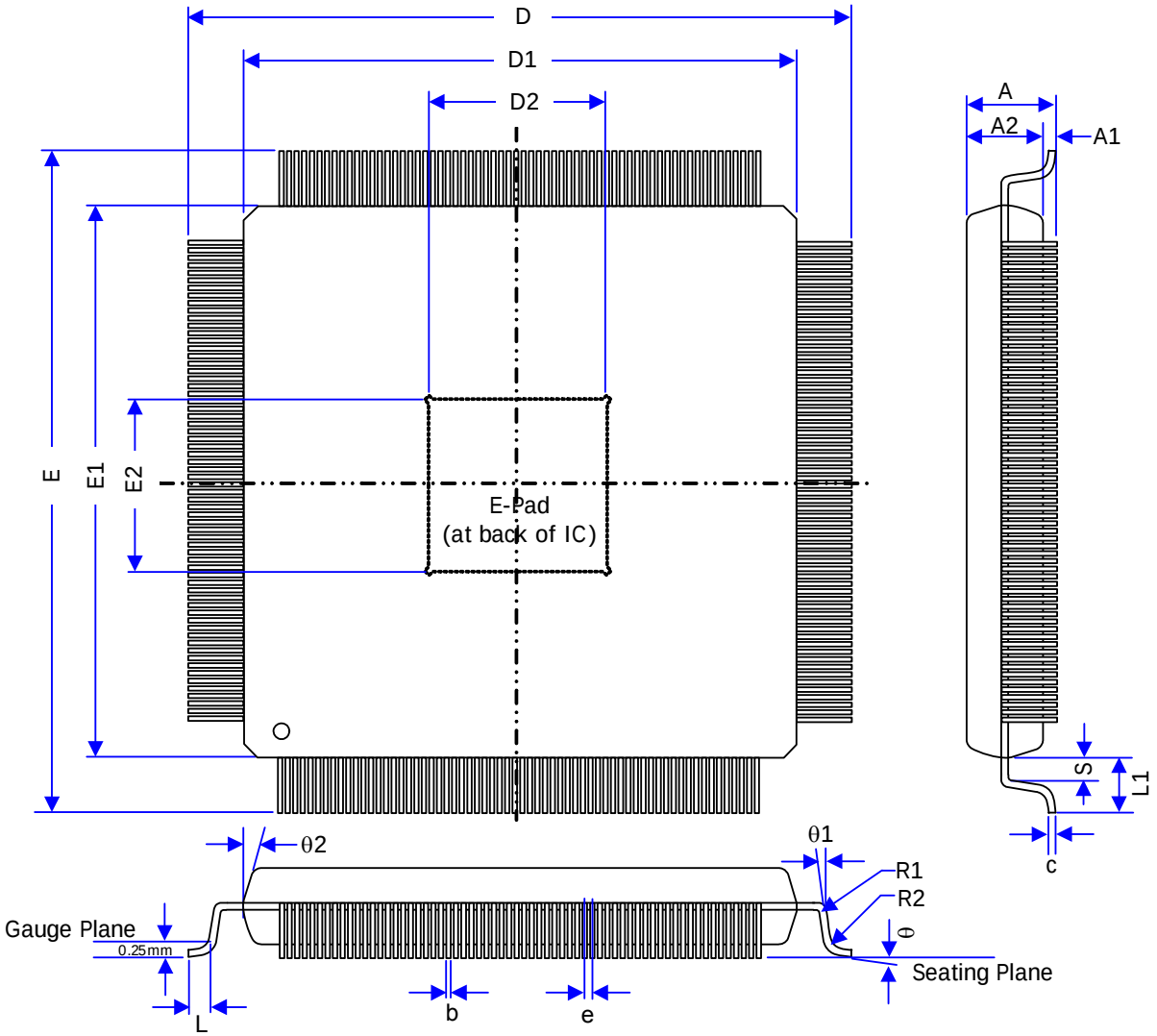
MECHANICAL DIMENSIONS



Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	1.6	-	-	0.063
A1	0.05	-	-	0.002	-	-
A2	1.35	1.40	1.45	0.053	0.055	0.057
D	30.00			1.181		
D1	28.00			1.102		
D2	-	-	10.0	-	-	0.394
E	30.00			1.181		
E1	28.00			1.102		
E2	-	-	10.0	-	-	0.394

Symbol	Millimeter			Inch		
	Min.	Nom.	Max.	Min.	Nom.	Max.
θ	0°	-	7°	0°	-	7°
θ1	0°	-	-	0°	-	-
θ2	12° Ref			12° Ref		
b	0.11	0.16	0.21	0.004	0.006	0.008
c	0.12	-	0.20	0.005	-	0.008
e	0.40 TYP.			0.0157 TYP.		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 Ref			0.039 Ref		
S	0.20	-	-	0.008	-	-

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DDR2_ 32bit.SchDoc
System & Panel Memory

POWER_LVDS.SchDoc
Panel Interface

SCART.SchDoc
Keyboard + IR

POWER_LVDS.SchDoc
PSU

DDR2_ 32bit.SchDoc
Backlight

DDR2_ 32bit.SchDoc
Memory

Audio Amp.SchDoc
Audio

SCART.SchDoc
SIDE AV

SCART.SchDoc
Headphone

CI

CI_PCMCIA.SchDoc

Demod.SchDoc
Digital Demod

HDMI3
HDMI.SchDoc

HDMI.SchDoc
HDMI

HDMI2
HDMI.SchDoc

HDMI1
HDMI.SchDoc

DVB_Tuner.SchDoc
DVB Tuner

SCART.SchDoc
VGA

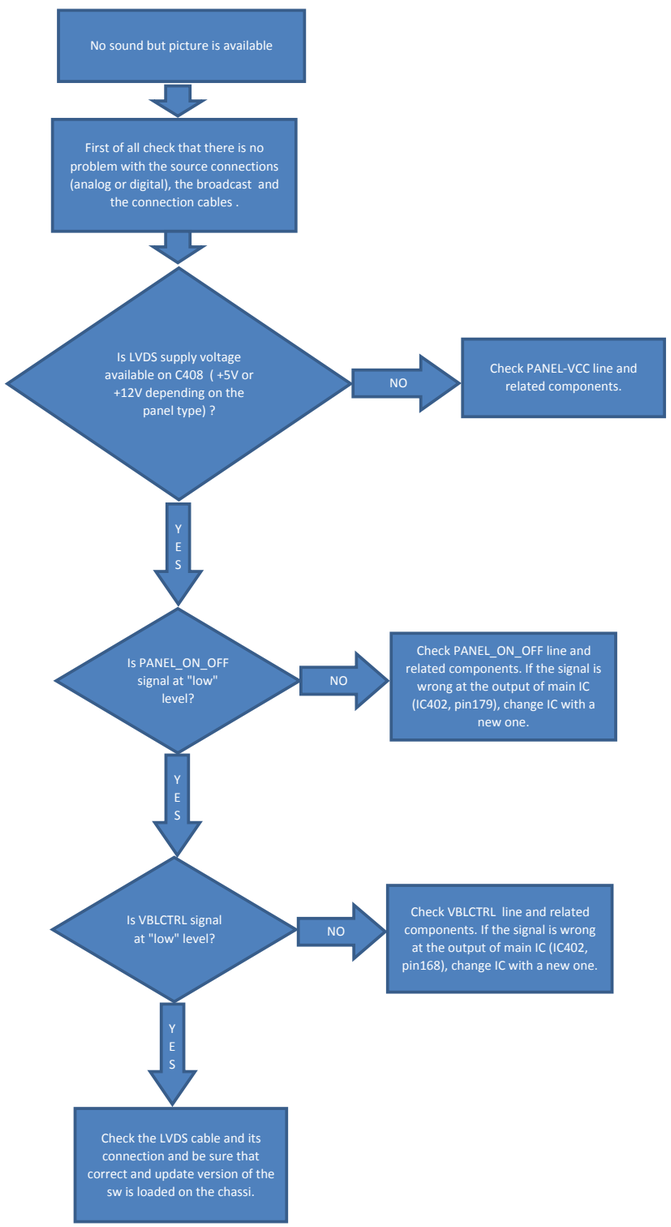
SCART.SchDoc
YPbPr

SCART.SchDoc
SCART

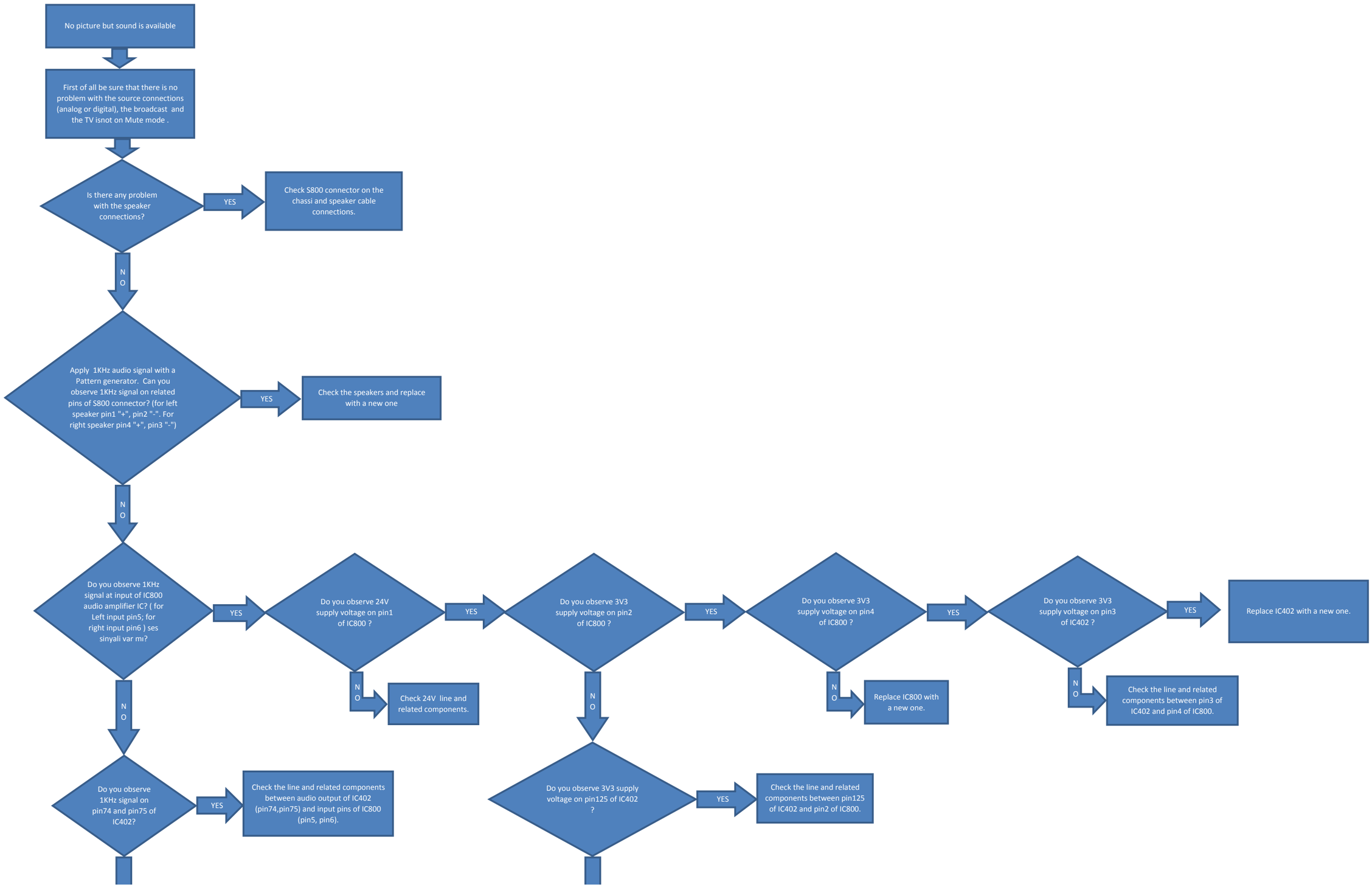
Title		
Size A4	Number	Revision
Date: 26.06.2008		Sheet of
File: D:\projects\..\Block_diagram.SchDoc		Drawn By:

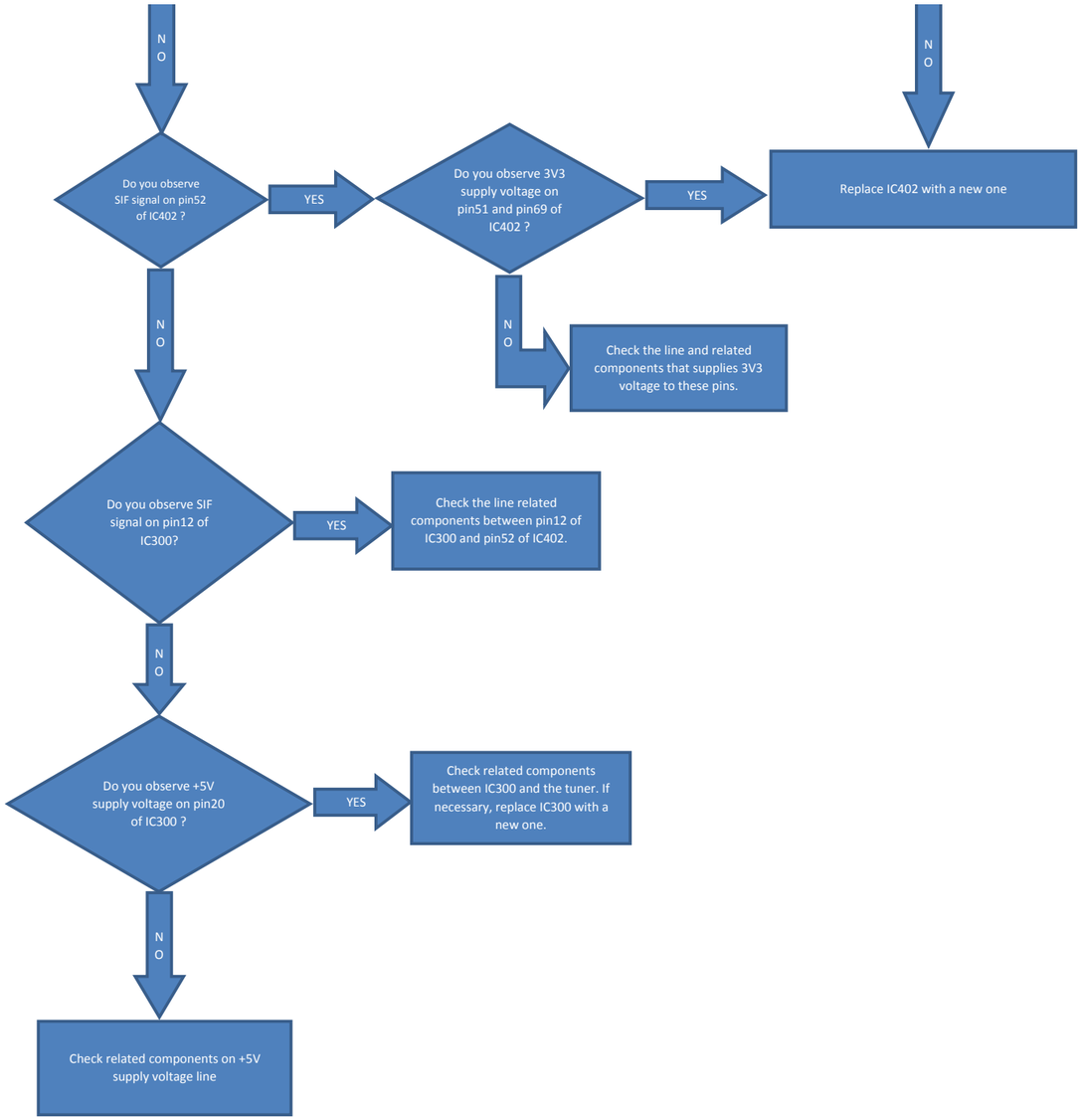
SE CHASSI TROUBLESHOOT

PICTURE


No sound but picture is available
First of all check that there is no problem with the source connections (analog or digital), the broadcast and the connection cables .
Is LVDS supply voltage available on C408 (+5V or +12V depending on the panel type) ?
NO
Check PANEL-VCC line and related components.
YES
Is PANEL_ON_OFF signal at "low" level?
NO
Check PANEL_ON_OFF line and related components. If the signal is wrong at the output of main IC (IC402, pin179), change IC with a new one.
YES
Is VBLCTRL signal at "low" level?
NO
Check VBLCTRL line and related components. If the signal is wrong at the output of main IC (IC402, pin168), change IC with a new one.
YES
Check the LVDS cable and its connection and be sure that correct and update version of the sw is loaded on the chassi.

SES


No picture but sound is available
First of all be sure that there is no problem with the source connections (analog or digital), the broadcast and the TV isnot on Mute mode .
Is there any problem with the speaker connections?
YES
Check S800 connector on the chassi and speaker cable connections.
NO
Apply 1KHz audio signal with a Pattern generator. Can you observe 1KHz signal on related pins of S800 connector? (for left speaker pin1 "+", pin2 "-". For right speaker pin4 "+", pin3 "-")
YES
Check the speakers and replace with a new one
NO
Do you observe 1KHz signal at input of IC800 audio amplifier IC? (for Left input pin5; for right input pin6) ses sinyali var mı?
YES
Do you observe 24V supply voltage on pin1 of IC800 ?
YES
Do you observe 3V3 supply voltage on pin2 of IC800 ?
YES
Do you observe 3V3 supply voltage on pin4 of IC800 ?
YES
Do you observe 3V3 supply voltage on pin3 of IC402 ?
YES
Replace IC402 with a new one.
NO
Check the line and related components between pin3 of IC402 and pin4 of IC800.
NO
Replace IC800 with a new one.
NO
Check 24V line and related components.
NO
Do you observe 3V3 supply voltage on pin125 of IC402 ?
YES
Check the line and related components between pin125 of IC402 and pin2 of IC800.
NO
Do you observe 1KHz signal on pin74 and pin75 of IC402?
YES
Check the line and related components between audio output of IC402 (pin74,pin75) and input pins of IC800 (pin5, pin6).


NO
Do you observe SIF signal on pin52 of IC402 ?
YES
Do you observe 3V3 supply voltage on pin51 and pin69 of IC402 ?
YES
NO
Replace IC402 with a new one
NO
Check the line and related components that supplies 3V3 voltage to these pins.
NO
Do you observe SIF signal on pin12 of IC300?
YES
Check the line related components between pin12 of IC300 and pin52 of IC402.
NO
Do you observe +5V supply voltage on pin20 of IC300 ?
YES
Check related components between IC300 and the tuner. If necessary, replace IC300 with a new one.
NO
Check related components on +5V supply voltage line